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Mail Stop Appeal Brief-Patents
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TRANSMITTAL LETTER

RE: Applicant(s): Thomas P. Glenn et al.

Assignee: Amkor Technology, Inc.

Title: FLIP CHIP ON GLASS IMAGE SENSOR PACKAGE

Serial No.: 09/713,848 Filed: November 15, 2000

Examiner: Graybill, D. Group Art 2827
Unit:

Docket No.: G0030

Dear Sir:

Transmitted herewith are the following documents in support of the Notice of Appeal filed on March 8, 2004 in the above application:

1. Return Receipt Postcard;
2. Check in the amount of \$330.00 for filing a brief in support of an appeal;
3. Transmittal Letter (2 pages); and
4. Appellants' Brief (28 pages in triplicate).

Transmittal Letter
Serial No. 09/713,848

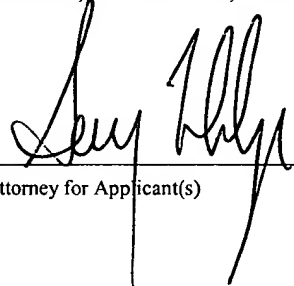
May 10, 2004

☒ Conditional Petition for Extension of Time: If an extension of time is required for timely filing of the enclosed documents after all papers filed with this transmittal have been considered, Applicant(s) hereby petition for such an extension of time.

☒ The Commissioner is hereby authorized to charge any additional fees required for consideration of the enclosed documents, and to credit any overpayment of fees to Deposit Account No. 50-0553.

CERTIFICATE OF MAILING

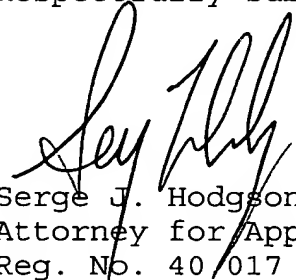
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 10, 2004.



Attorney for Applicant(s)

May 10, 2004
Date of Signature

Respectfully submitted,


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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Monterey, CA
May 10, 2004

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APPELLANTS' BRIEF

Dear Sir:

Pursuant to 37 CFR § 1.192(a), Appellants file in triplicate this Appellants' Brief in support of the Notice of Appeal filed on March 8, 2004.

REAL PARTY IN INTEREST

The assignee of the above-referenced patent application, Amkor Technology, Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known to Appellants, the undersigned Attorney for Applicants, or the Assignee, which will directly affect, or be directly affected by, or have a bearing on the Board's decision in this pending Appeal.

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STATUS OF CLAIMS

Claims 1, and 3-29 are pending and Claim 2 has been canceled without prejudice. Claims 1, and 3-29 stand rejected in the Final Office Action of December 16, 2003. The rejection of Claims 1, and 3-29 is hereby appealed.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF THE INVENTION

With respect to Claims 1, and 3-29, embodiments in accordance with the present invention provide a structure which is illustrated, for example, at least in FIGS. 1-3, 8 and described in Appellants' specification at least at page 5, line 26 to page 16, line 13; and page 19, line 11 to page 20, line 4. A summary is provided below for each claim.

CLAIMS 1, 5, 9-10, 21, 27-29

With respect to Claims 1, 5, 9-10, 21, 27-29, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 5, line 26 to line 32:

An image sensor package 100 (FIGS. 1, 2) includes **an image sensor 102 ... having an active area 104 and bond pads 106 on a front surface 102F of image sensor 102. A window 110 of image sensor package 100 has an interior surface 110I and an exterior surface 110E opposite interior surface 110I.** (Emphasis added.)

Further, as described in Appellants' specification at least at page 8, line 19 to line 21:

Window 110 includes **an interior, e.g., first, surface 110I, which faces towards front surface 102F of image sensor 102.** (Emphasis added.)

Further, as clearly illustrated in both FIGS. 1 and 2, and as described in Appellants' specification at least at page 6, line 18 to line 19 and at page 13, line 7 to line 10:

Window 110 has an area less than an area of front surface 102F of image sensor 102. (Emphasis added.)

Of importance, the area of window 110 in a plane parallel to front surface 102F of image sensor 102 is less than the area of front surface 102F in this same plane. (Emphasis added.)

Further, as described in Appellants' specification at least at page 8, line 27 to page 9, line 16:

Formed on interior surface 110I are a plurality of electrically conductive interior traces 114, which include a first interior trace 114A. ... Bond pads 106 are electrically connected to corresponding interior traces 114 by corresponding electrically conductive bumps 112,

Formed on exterior surface 110E are a plurality of electrically conductive exterior traces 116, which include a first exterior trace 116A. Exterior traces 116 are electrically connected to corresponding interior traces 114 by corresponding electrically conductive vias 118. Vias 118 extend through window 110 from interior surface 110I to exterior surface 110E.

Formed on exterior traces 116 are a plurality of electrically conductive pads 120, which include a first pad 120A. Formed on pads 120 are a plurality of electrically conductive interconnection balls 122, e.g., solder, which include a first interconnection ball 122A. (Emphasis added.)

CLAIMS 3, 25

With respect to Claims 3, 25, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 6, line 18 to line 22:

Window 110 has an area less than an area of front surface 102F of image sensor 102. Advantageously, this allows image sensor package 100 to be the size of image

sensor 102, i.e., **image sensor package 100 is chip size.** (Emphasis added.)

CLAIM 4

With respect to Claim 4, an embodiment as described in Appellants' specification at least at page 7, line 10 to line 14:

Generally, **window 110 is transparent to the radiation of interest, e.g., to the radiation to which active area 104 of image sensor 102 is responsive ...** (Emphasis added.)

CLAIM 6

With respect to Claim 6, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 10, line 14 to line 22:

In one embodiment, **interior traces 114 are lands aligned horizontally in the view of FIG. 2 with vias 118, bumps 112 and bond pads 106. To illustrate, a second interior trace 114B ... is a land. Interior trace 114B is aligned with a second via 118B ..., with a second bump 112B ... and with a second bond pad 106B ...** (Emphasis added.)

CLAIM 7

With respect to Claim 7, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 10, line 23 to line 28:

Alternatively, **interior traces 114 are metallizations which extend along interior surface 110I of window 110 such that vias 118 are not aligned with bumps 112 and bond pads 106. To illustrate, interior trace 114A extends horizontally in the view of FIG. 2 from bump 112A (and bond pad 106A) to via 118A.** (Emphasis added.)

CLAIM 8

With respect to Claim 8, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 10, line 28 to line 31:

Stated another way, **via 118A is offset from bump 112A and interior trace 114A extends along interior surface 110I to electrically connect via 118A to bump 112A.** (Emphasis added.)

CLAIM 11

With respect to Claim 11, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 10, line 32 to page 11, line 2:

Similarly, **exterior traces 116 are lands aligned horizontally in the view of FIG. 2 with vias 118, pads 120 and interconnection balls 122.** To illustrate, exterior trace 116A is a land. Exterior trace 116A is aligned with via 118A, with pad 120A and with interconnection ball 122A. (Emphasis added.)

CLAIM 12

With respect to Claim 12, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 11, line 3 to line 10:

Alternatively, **exterior traces 116 are metallizations which extend along exterior surface 110E of window 110 such that vias 118 are not aligned with pads 120 and interconnection balls 122.** To illustrate, a second exterior trace 116B of the plurality of exterior traces 116 extends horizontally in the view of FIG. 2 from second via 118B to a second pad 120B of the plurality of pads 120. (Emphasis added.)

CLAIM 13

With respect to Claim 13, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 11, line 10 to line 13:

Stated another way, via 118B is offset from pad 120B and exterior trace 116B extends along exterior surface 110E to electrically connect via 118B to pad 120B.
(Emphasis added.)

CLAIMS 14, 22

With respect to Claims 14 and 22, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 6, line 3 to line 8:

Window 110 includes a central region CR aligned with active area 104 of image sensor 102. A peripheral region PR of window 110 includes interior traces 114, exterior traces 116 formed on exterior surface 110E of window 110, and vias 118 electrically connecting exterior traces 116 to interior traces 114. (Emphasis added.)

CLAIMS 15-18, 23

With respect to Claims 15-18, 23, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 12, line 5 to line 33:

A bead 130 contacts the periphery of front surface 102F of image sensor 102 adjacent sides 102S of image sensor 102. Bead 130 also contacts peripheral region PR of window 110 thus securing window 110 to image sensor 102. ...

Further, bead 130 forms a seal between peripheral region PR of window 110 and image sensor 102. Thus, window 110, bead 130, and image sensor 102 define a cavity 132, which is sealed. ...

Generally, cavity 132 contains a medium 140, which is transparent to the radiation of interest. In one embodiment, medium 140 is air. (Emphasis added.)

CLAIM 19

With respect to Claim 19, an embodiment provides a structure which is illustrated, for example, in FIG. 3 and described in Appellants' specification at least at page 13, line 33 to line 34:

Referring now to FIG. 3, in this embodiment, medium 140A is a transparent encapsulant, not air. (Emphasis added.)

CLAIMS 20, 26

With respect to Claims 20, 26, an embodiment provides a structure which is illustrated, for example, in FIG. 8 and described in Appellants' specification at least at page 19, line 14 to line 17:

Referring to FIG. 8, structure 800 includes an image sensor substrate 802 such as a silicon wafer. Image sensor substrate 802 includes a plurality of image sensors 102 integrally connected together. (Emphasis added)

CLAIM 24

With respect to Claim 24, an embodiment provides a structure which is illustrated, for example, in FIGS. 1-2 and described in Appellants' specification at least at page 13, line 11 to line 13:

Bead 130 has outer sides 130S coplanar with sides 102S of image sensor 102. (Emphasis added.)

ISSUES

1. Whether Claims 1, 4-15, 20 and 27 are novel over Takase et al. (5,463,229)?

2. Whether Claim 3 is patentable over Takase et al., and in the alternative, over Takase et al. in combination with Naito et al. (6,011,310)?

3. Whether Claims 21-23, 26, 28 and 29 are patentable over Takase et al. in combination with Farnworth et al. (5,962,921)?

4. Whether Claims 16-19 are patentable over Takase et al. in combination with Glenn (5,949,655)?

5. Whether Claims 24-25 are patentable over Takase et al. in combination with Farnworth et al. and Glenn?

GROUPING OF CLAIMS

The grouping of claims is set forth below under ARGUMENTS for each ground of rejection.

ARGUMENTS

1. Whether Claims 1, 4-15, 20 and 27 are novel over Takase et al.?

Claims 1, 4-15, 20 and 27 stand and fall together.

In both the Final Office Action dated December 16, 2003 at pages 3-4 and the Office Action dated October 8, 2002 at page 4, the Examiner states:

... Takase teaches the following: 1. A structure comprising: an image sensor 16 having an active area and a bond pad on a first surface of said image sensor; **a window 1 having an interior surface** and an exterior surface opposite said interior surface; said

interior surface of said window facing said first surface of said image sensor, the window having **an area of said interior surface** that is less than the area of said first surface of said image sensor; **the area of said interior surface** of said window **that is less than** the area of said first surface of said image sensor being less than the area of said first surface of said image sensor ... (Emphasis added.)

In response to the Examiner's rejection, Appellants explained in the Amendment of January 8, 2003:

Accordingly, the Examiner asserts that "the window having **an area** of said interior surface that is less than the area of said first surface of said image sensor". Applicants note that the Examiner has failed to callout where Takase et al. teaches or suggests that **the area, i.e. the total area**, of the "interior surface" is "less than the area of said first surface of said image sensor".

Further, the Examiner asserts:

... Takase teaches that the size of the structure is a result effective variable; namely, that reduced structure size is desirable. (Office Action, page 7.)

However, Applicants respectfully submit that Takase et al. teaches away from the area of the interior surface of the "window 1" being less than the area of the first surface of the image sensor since this would defeat to the ability to connect the external circuit to the external connection terminals 30 (see FIG. 4) formed on the interior surface, i.e., the first primary surface, of the "window 1".

More particularly, Takase et al. teaches:

With reference to **the first primary surface**, it is noticed that **external connection terminals 30** of the same number as the number of aggregated electrodes 3 are provided thereon in the area corresponding to one end of the aggregated electrode 3 together **being the periphery of the optical circuit board**. Each of the **external connection terminals 30** has a pad-like form to be used for connection with the external

circuit, ... (Col. 17, lines 8-15, emphasis added.)

Thus, assuming for argument, if the area of the interior surface, i.e., the first primary surface, of the window 1 was less than the area of the first surface of the image sensor then the external connection terminals 30 would be covered by the image sensor. This would defeat the ability to connect the external circuit to the external connection terminals 30.

As set forth above, Appellants have demonstrated that the Examiner has failed to call out where Takase et al. teaches or suggests that **the** area of the "interior surface" is "less than **the** area of said first surface of said image sensor. In response to the Appellants' arguments, the Examiner further asserts in the Final Office Action dated December 16, 2003:

Also, applicant argues that the applied prior art does not teach the limitation, "the area of said interior surface of said window being less than the area of said first surface of said image sensor," because, allegedly, the applied prior art does not teach "**the total area**, of the 'interior surface' is 'less than the area of said first surface of said image sensor'."

This argument is respectfully deemed unpersuasive because the scope of the instant claims is not limited to "the total area," and the prior art is not necessarily applied to the rejections for a teaching of "the total area."

To further clarify, the scopes of the limitations "an interior surface" and "an exterior surface" each encompass a portion of a larger surface; hence, they are not limited to the entirety of any larger surface.

Further, in view of the lack of antecedent basis or other further limiting language for the term "the area," it is inherent that the interior surface of the window has an area that can be denoted "the area" which is less than an area that can be denoted "the area" of the first surface of the image sensor. (Pages 12-13, emphasis in original.)

As set forth above, the Examiner admits that Takase et al. does not teach or suggest that **the** area of the "interior surface" is "less than **the** area of said first surface of said image sensor. Nevertheless, the Examiner asserts that an area, which apparently is arbitrarily selected and is not identified by the Examiner, of the interior surface of the window is less than an area, which again is apparently arbitrarily selected and is not identified by the Examiner, of the first surface of the image sensor.

Appellants note that the Examiner has already conceded that the interior surface of the window and the first surface of the image sensor have inherent areas. Specifically, Appellants note that in the Office Action dated July 18, 2002, the Examiner rejected Claims 27 and 29 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In support of this rejection, the Examiner stated:

In claims 27 and 29 **there is insufficient antecedent basis for the language "the area of said window" and "the area of said first surface of said image sensor.** (Page 3, emphasis added).

In response to the Examiner's rejection, Appellants explained in the Amendment of September 18, 2002:

With regard to Claim 27, Applicants point out that Claim 27 has been amended and now recites in pertinent part:

An image sensor package comprising: ...
a window having an interior surface,
the area of said interior surface of said window being less than the area of said first surface of said image sensor; ...
(Emphasis Added).

Applicants submit that both the "interior surface of said window" and the "first surface of the image

sensor" inherently include areas. Thus, recitation of "the" area of said interior surface of said window and "the" area of said first surface of said image sensor is proper. The Manual of Patent Examining Procedure (M.P.E.P.) states:

Inherent components of elements recited have antecedent basis in the recitation of the components themselves. For example, the limitation "the outer surface of said sphere" would not require an antecedent recitation that the sphere has an outer surface. (M.P.E.P. § 2172.05(f); page 2100-200, August 2001, emphasis added).

Accordingly, Claim 27 satisfies 35 U.S.C. 112, second paragraph.

With regard to Claim 29, the Examiner's statement above is respectfully traversed.

Claim 29 recites in pertinent part:

An image sensor package comprising: ...
a window mounted to said image sensor,
the area of said window in a plane parallel to said first surface of said image sensor
...; (Emphasis Added).

Applicants respectfully submit that "the" area of said window is clearly and unambiguously defined in the claim as the inherent area of the recited window "in a plane parallel to said first surface of said image sensor".

Thus, recitation of "the" area of said window in a plane parallel to said first surface of said image sensor is proper at least for reasons similar to Claim 27.

In response to the Appellants' arguments, the Examiner withdrew the 35 U.S.C. 112, second paragraph, rejection of Claims 27 and 29 thus conceding that the Appellants' arguments are persuasive.

As set forth in *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 34 U.S.P.Q.2d (BNA) 1321 (1995):

... the focus is on the objective test of what one of ordinary skill in the art at the time of the invention would have understood the term to mean.

Appellants respectfully submit that one of ordinary skill in the art at the time of the invention would have understood that "the area" of said interior surface and "the area" of said first surface refer to the inherent areas of the interior surface and the first surface, respectively.

Further, **as clearly illustrated in both FIGS. 1 and 2**, and as described in Appellants' specification at least at page 6, line 18 to line 19 and at page 13, line 7 to line 11:

Window 110 has an area less than an area of front surface 102F of image sensor 102.

Of importance, the area of window 110 in a plane parallel to front surface 102F of image sensor 102 is less than the area of front surface 102F in this same plane. This allows package 100 to be the size of image sensor 102, i.e., package 100 is chip size.

As set forth in Digital Biometrics v. Identix, Inc., 149 F.3d 1335, 47 U.S.P.Q.2d(BNA) 1418 (1994):

To determine the proper meaning of claims we first consider the so-called intrinsic evidence, i.e., the claims, **the written description**, and, if in evidence, the prosecution history. (Emphasis added.)

For at least the above reasons, Takase et al. does not teach or suggest a structure comprising:

an image sensor having an active area and a bond pad on a first surface of said image sensor;

a window having an interior surface and an exterior surface opposite said interior surface, said interior surface of said window facing said first surface of said image sensor, **the area of said interior surface of said window being less than the area of said first surface of said image sensor**; and

an electrically conductive via extending through said window from said interior surface to said exterior surface of said window, said via being electrically connected to said bond pad,

as recited in Claim 1, emphasis added. Accordingly, Claim 1 is allowable over Takase et al. Claims 4-15, 20, which depend from Claim 1, are allowable for at least the same reasons as Claim 1.

For similar reasons, Takase et al. does not teach or suggest an image sensor package comprising:

an image sensor having a bond pad on a first surface of said image sensor;

a window having an interior surface, the area of said interior surface of said window being less than the area of said first surface of said image sensor;

an electrically conductive interior trace on said interior surface of said window; and

an electrically conductive bump electrically connecting said bond pad to said interior trace,

as recited in Claim 27, emphasis added. Accordingly, Claim 27 is allowable over Takase et al.

In conclusion, Appellants have specified the errors in the rejection and why the rejected claims are patentable under 35 U.S.C. 102 including the specific limitations in the rejected claims which are not described in Takase et al. Thus, the Examiner's rejection of Claims 1, 4-15, 20 and 27 as anticipated by Takase et al. should be reversed.

2. Whether Claim 3 is patentable over Takase et al., and in the alternative, over Takase et al. in combination with Naito et al.?

As discussed above, Claim 1 is allowable over Takase et al. Claim 3, which depends from Claim 1, is allowable over Takase et al. for at least the same reasons as Claim 1.

With regards to Naito et al., the Examiner states that "Naito teaches a chip size package" (Office Action dated December 16, 2003, page 7). However, this does not cure the previously described deficiency of Takase et al. Accordingly, Claim 3 is allowable over Takase et al. in combination with Naito et al.

In conclusion, Appellants have explained why the combination of Takase et al. and Naito et al., taken as a

whole, do not suggest the subject matter of Claim 3. Thus, the Examiner's rejection of Claim 3 as being unpatentable over Takase et al., or in the alternative, the combination of Takase and Naito et al. should be reversed.

3. Whether Claims 21-23, 26, 28 and 29 are patentable over Takase et al. in combination with Farnworth et al.?

Claims 21-23, 26, 28-29 stand and fall together.

Initially, Appellants note that Claim 21 recites:

An image sensor package comprising:
an image sensor having an active area and bond pads on a first surface of said image sensor;
a window having an interior surface and mounted to said image sensor, **the area of said interior surface of said window being less than the area of said first surface of said image sensor;**
a plurality of electrically conductive interior traces on an interior surface of said window;
a plurality of electrically conductive bumps electrically and physically connecting said bond pads to said interior traces;
a plurality of electrically conductive vias extending from said interior surface of said window to an exterior surface of said window, said vias being electrically connected to said interior traces;
a plurality of electrically conductive exterior traces on said exterior surface of said window, said exterior traces being electrically connected to said vias;
a plurality of electrically conductive pads on said exterior traces; and
a plurality of electrically conductive interconnection balls on said electrically conductive pads. (Emphasis added.)

For reasons similar to those discussed above regarding Claim 1, Claim 21 is allowable over Takase et al. With regards to Farnworth et al., the Examiner states in the Office Action dated December 16, 2003 at page 10:

Nevertheless, at column 1, lines 14-44 and column 5, lines 14-22, Farnworth teaches interconnection balls 12A, 12C.

This does not cure the previously described deficiencies in Takase et al. Accordingly, Claim 21 is allowable over Takase et al. in view of Farnworth et al. Claims 22-23, 26, which depend from Claim 21 are allowable for at least the same reasons as Claim 21. Claim 28, which depends from Claim 1, is allowable for at least the same reasons as Claim 1. Claim 29 is allowable for reasons similar to Claim 21.

Further, Claim 21 recites:

... a plurality of electrically conductive pads on said exterior traces; and
a plurality of electrically conductive interconnection balls on said electrically conductive pads (Emphasis added.)

For this additional reason, Claim 21 is allowable over Takase et al. in view of Farnworth et al.

Specifically, in the Office Action dated December 16, 2003 at pages 7-8, the Examiner asserts:

As cited, Takase teaches the following:

21. An image sensor package comprising: ... a plurality of **electrically conductive pads on said exterior traces**; and a plurality of **electrically conductive interconnection bumps** on said electrically conductive pads. (Emphasis added.)

Appellants note that the Examiner has failed to identify in the Office Action dated December 16, 2003 any structure of Takase et al. that can be characterized as "electrically conductive pads on said exterior traces" or "a plurality of electrically conductive interconnection bumps".

However, in the Office Action dated January 18, 2002 at page 4, the Examiner asserted that Takase et al teaches:

9. The structure of 1 further comprising an electrically conductive **exterior trace 3** on said exterior surface of said window, said exterior trace being electrically connected to said via. (Emphasis added.)

In response to the Examiner's rejection, Appellants explained in the Amendment of April 17, 2002 at page 5:

However, in reference to FIG. 2, Takase teaches:

A transparent protection layer 8 is provided in such a manner to cover the second primary surface including the antistatic layer 6 and the aggregated electrode 3 provided thereon.

(Col. 15, lines 46-50, emphasis added.)

Accordingly, the "exterior trace 3" is covered with a transparent protection layer 8, which would defeat the formation of interconnection structures on the "exterior trace 3". Thus, the Examiner has failed to callout where Takase teaches or suggest an electrically conductive pad on the exterior trace and an interconnection ball on the pad.

As explained above, since the "exterior trace 3" is covered with a transparent protection layer 8, the purpose of formation of interconnection structures on the "exterior trace 3" is defeated. In fact, the Examiner admits "Takase does not appear to explicitly teach interconnection balls." at page 10 of the Office Action dated December 16, 2003.

To cure this glaring deficiency in Takase et al., the Examiner further asserts in the Office Action dated December 16, 2003 at page 10:

Nevertheless, at column 1, lines 14-44 and column 5, lines 14-22, Farnworth teaches interconnection balls 12A, 12C.

Moreover, it would have been obvious to combine the product of Farnworth with the product of Takase because it would provide interconnection bumps and external connection solder bumps.

Again, since the "exterior trace 3" is covered with a transparent protection layer 8, the purpose of formation of interconnection structures (such as the "interconnection balls"

of Farnworth et al.) on the "exterior trace 3" is defeated. Thus, one of skill in the art would have no motivation to combine Takase et al. with Farnsworth et al. as asserted by the Examiner.

Still further, as Appellants explained in the Amendment of January 8, 2003 at page 4:

More particularly, Takase et al. teaches:

With reference to the first primary surface, it is noticed that **external connection terminals 30** of the same number as the number of aggregated electrodes 3 are provided thereon in the area corresponding to one end of the aggregated electrode 3 together **being the periphery of the optical circuit board. Each of the external connection terminals 30 has a pad-like form to be used for connection with the external circuit, ...** (Col. 17, lines 8-15, emphasis added.)

Since Takase et al. **already provides** "external connection terminals 30 has a pad-like form to be used for connection with the external circuit", which Appellants note are on the "interior surface" of the window, one of skill in the art would again have no motivation to "combine the product of Farnworth with the product of Takase because it would provide interconnection bumps and external connection solder bumps" as asserted by the Examiner.

For at least the above reasons, Claim 21 is allowable over Takase et al. in view of Farnsworth et al. Claims 22-23 and 26, which depend from Claim 21, are allowable for at least the same reasons as Claim 21. Claims 28 and 29 are allowable for reasons similar to Claim 21.

In conclusion, Appellants have explained why the combination of Takase et al. and Farnsworth et al., taken as a whole, do not suggest the subject matter of Claims 21-23, 26, 28-29. Thus, the Examiner's rejection of Claims 21-23, 26,

28-29 as being unpatentable over the combination of Takase et al. and Farnworth et al. should be reversed.

4. Whether Claims 16-19 are patentable over Takase et al. in combination with Glenn?

Claims 16-19 stand and fall together.

As discussed above, Claim 1 is allowable over Takase et al. Claims 16-19, which depend from Claim 1, are allowable over Takase et al. for at least the same reasons as Claim 1.

With regards to Glenn, the Examiner states that "Glenn teaches wherein a bead 22, and an image sensor 10 define a sealed cavity 19" (Office Action dated December 16, 2003, page 11). However, this does not cure the previously described deficiency of Takase et al. Accordingly, Claims 16-19 are allowable over Takase et al. in combination with Glenn.

In conclusion, Appellants have explained why the combination of Takase et al. and Glenn, taken as a whole, do not suggest the subject matter of Claims 16-19. Thus, the Examiner's rejection of Claims 16-19 as being unpatentable over the combination of Takase and Glenn should be reversed.

5. Whether Claims 24-25 are patentable over Takase et al. in combination with Farnworth et al. and Glenn?

Claims 24-25 stand and fall together.

As discussed above, Claim 21 is allowable over Takase et al. in combination with Farnworth et al. Claims 24-25, which depend from Claim 21, are allowable over Takase et al. in combination with Farnworth et al. for at least the same reasons as Claim 1.

With regards to Glenn, the Examiner states that "Glenn teaches an image sensor package wherein a bead 22 has sides coplanar with sides of an image sensor 10" (Office Action dated December 16, 2003, page 11). However, this does not cure the previously described deficiency of Takase et al. in view of Farnworth et al. Accordingly, Claims 24-25 are allowable over Takase et al. in combination with Farnsworth et al. and Glenn.

In conclusion, Appellants have explained why the combination of Takase et al., Farnworth et al. and Glenn, taken as a whole, do not suggest the subject matter of Claims 24-25.

Thus, the Examiner's rejection of Claims 24-25 as being unpatentable over the combination of Takase et al., Farnworth et al., and Glenn should be reversed.

CONCLUSION

For the reasons above, all appealed claims, i.e., Claims 1, 3-29, are allowable. Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the Examiner's various rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a) of these claims.

APPENDIX

1. (Previously presented) A structure comprising:
an image sensor having an active area and a bond pad on a first surface of said image sensor;
a window having an interior surface and an exterior surface opposite said interior surface, said interior surface of said window facing said first surface of said image sensor, the area of said interior surface of said window being less than the area of said first surface of said image sensor; and
an electrically conductive via extending through said window from said interior surface to said exterior surface of said window, said via being electrically connected to said bond pad.

3. (Previously presented) The structure of Claim 1 wherein said structure is a chip size image sensor package.

4. (Original) The structure of Claim 1 wherein said active area is responsive to radiation, said window being transparent to said radiation.

5. (Original) The structure of Claim 1 further comprising:

an electrically conductive interior trace on said interior surface of said window; and

an electrically conductive bump electrically connecting said bond pad to said interior trace.

6. (Original) The structure of Claim 5 wherein said interior trace is a land aligned with said via, said bump and said bond pad.

7. (Original) The structure of Claim 5 wherein said interior trace is a metallization extending along said interior surface of said window.

8. (Original) The structure of Claim 5 wherein said via is offset from said bump, said interior trace extending along said interior surface of said window to electrically connect said via to said bump.

9. (Original) The structure of Claim 1 further comprising an electrically conductive exterior trace on said exterior surface of said window, said exterior trace being electrically connected to said via.

10. (Original) The structure of Claim 9 further comprising an electrically conductive pad on said exterior trace.

11. (Previously presented) The structure of Claim 10 wherein said exterior trace is a land aligned with said via and said electrically conductive pad.

12. (Original) The structure of Claim 10 wherein said exterior trace is a metallization extending along said exterior surface of said window.

13. (Previously presented) The structure of Claim 10 wherein said via is offset from said electrically conductive pad, said exterior trace extending along said exterior surface of said window to electrically connect said via to said electrically conductive pad.

14. (Original) The structure of Claim 1 wherein said window includes a central region and a peripheral region, said central region being aligned with said active area, said via being formed within said peripheral region.

15. (Original) The structure of Claim 14 further comprising a bead contacting said first surface of said image sensor and further contacting said peripheral region of said window, said bead forming a seal between said peripheral region of said window and said image sensor.

16. (Original) The structure of Claim 15 wherein said window, said bead, and said image sensor define a sealed cavity.

17. (Original) The structure of Claim 16 wherein said active area is responsive to radiation, said cavity containing a medium transparent to said radiation.

18. (Original) The structure of Claim 17 wherein said medium is air.

19. (Original) The structure of Claim 17 wherein said medium is an encapsulant.

20. (Original) The structure of Claim 1 further comprising an image sensor substrate comprising said image sensor.

21. (Previously presented) An image sensor package comprising:

an image sensor having an active area and bond pads on a first surface of said image sensor;

a window having an interior surface and mounted to said image sensor, the area of said interior surface of said window being less than the area of said first surface of said image sensor;

a plurality of electrically conductive interior traces on an interior surface of said window;

a plurality of electrically conductive bumps electrically and physically connecting said bond pads to said interior traces;

a plurality of electrically conductive vias extending from said interior surface of said window to an exterior surface of said window, said vias being electrically connected to said interior traces;

a plurality of electrically conductive exterior traces on said exterior surface of said window, said exterior traces being electrically connected to said vias;

a plurality of electrically conductive pads on said exterior traces; and

a plurality of electrically conductive interconnection balls on said electrically conductive pads.

22. (Original) The image sensor package of Claim 21 wherein said window comprises a central region aligned with said active area and a peripheral region, said interior traces, said vias and said exterior traces being formed within said peripheral region.

23. (Original) The image sensor package of Claim 22 further comprising a bead forming a seal between said peripheral region and said image sensor.

24. (Original) The image sensor package of Claim 23 wherein said bead has sides coplanar with sides of said image sensor.

25. (Original) The image sensor package of Claim 24 wherein said image sensor package is chip size.

26. (Original) The image sensor package of Claim 21 further comprising an image sensor substrate comprising said image sensor.

27. (Previously presented) An image sensor package comprising:

an image sensor having a bond pad on a first surface of said image sensor;

a window having an interior surface, the area of said interior surface of said window being less than the area of said first surface of said image sensor;

an electrically conductive interior trace on said interior surface of said window; and

an electrically conductive bump electrically connecting said bond pad to said interior trace.

28. (Previously presented) The structure of Claim 10 further comprising an electrically conductive interconnection ball on said electrically conductive pad.

29. (Previously presented) An image sensor package comprising:

an image sensor having an active area and bond pads on a first surface of said image sensor;

a window mounted to said image sensor, the area of said window in a plane parallel to said first surface of said image sensor being less than the area of said first surface of said image sensor;

a plurality of electrically conductive interior traces on an interior surface of said window;

a plurality of electrically conductive bumps electrically and physically connecting said bond pads to said interior traces;

a plurality of electrically conductive vias extending from said interior surface of said window to an exterior surface of said window, said vias being electrically connected to said interior traces;

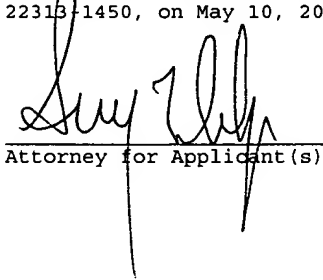
a plurality of electrically conductive exterior traces on said exterior surface of said window, said exterior traces being electrically connected to said vias;

a plurality of electrically conductive pads on said exterior traces; and

a plurality of electrically conductive interconnection balls on said electrically conductive pads.

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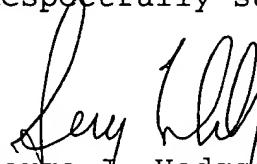
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 10, 2004.



Attorney for Applicant(s)

May 10, 2004
Date of Signature

Respectfully submitted,



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